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Issued November 1985

COMPLETED

CENTERS FOR DISEASE CONTROL

RABIES

SURVEILLANCE

ORIGINAL

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES • Public Health Service

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PREFACE

Summarized in this report is information received from health officials of the various states and their counterparts in the Federal Government. This information is intended primarily for use by those responsible for disease control activities. Anyone desiring to quote this report should verify data with the respective State health department for accuracy and interpretation.

Contributions to the Surveillance Report are most welcome. Please address to:

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I. RABIES REPORTS IN THE UNITED STATES, 1983

A. Summary

In 1983, a total of 5,880 laboratory-confirmed cases of rabies in the United States and its territories were reported to the Centers for Disease Control (CDC)--a decline of 398 cases compared with 1982 (1)(Table 1). The total number of cases decreased for the second consecutive year, the 13% decline in 1982 being followed by a 6.4% decline in 1983. This decrease in cases, however, was not reported by all states. The four Mid-Atlantic states--Maryland, Pennsylvania, Virginia, and West Virginia--and the District of Columbia actually experienced an 83% increase in cases. These states and the District of Columbia reported 1,903 cases in 1983 (compared with 1,040 cases in 1982) which accounted for approximately one-third (32.4%) of all rabies cases nationally.

B. Rabies in Wildlife

Skunks, raccoons, and bats continued to be the major wildlife hosts, accounting for 5,101 (96%) of 5,294 rabies cases in wildlife in 1983. Rabid bats were found in more states than were any other rabid wild species and were reported from all states except Alaska, Hawaii, North Dakota, Rhode Island, and the U.S. Territories (Figure 9).

Although the 5,294 cases in wildlife represented a 5% decrease from the 5,535 cases in 1982, the proportion in raccoons increased from 21% (1,156 cases) in 1982 to 36% (1,906 cases) in 1983. The four Mid-Atlantic states--Maryland, Pennsylvania, Virginia, and West Virginia--and the District of Columbia accounted for 84% of all reported cases of raccoon rabies (see Section F, The Mid-Atlantic States Raccoon Rabies Outbreak). The rabies outbreak in the Southeast (from 1955 to the present) has also involved primarily raccoons. Although this outbreak continued to spread northward in Georgia and South Carolina and westward in Alabama, the number of cases remained relatively constant with 331 in 1981, 296 in 1982, and 286 in 1983 (Figure 8).

C. Rabies in Domestic Animals

The total number of reported rabies cases in domestic animals (dogs, cats, and farm animals) continued to decline from the peak of 1,082 cases in 1981 to 743 in 1982 to 584 in 1983. Fewer cases were reported only in 1975 (433), 1976 (420), 1977 (445), and 1978 (469).

As illustrated in the following table, the number of rabies cases in cats in 1983 exceeded the number reported in dogs for the third consecutive year since it was first observed in 1981.

Rabies Cases, Cats vs. Dogs, 1980-1983

	Number of Cases	
Year	Cats	Dogs
1980	214	247
1981	285	216
1982	209	153
1983	168	132

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Further analysis of the data revealed that dogs and cats alike were most frequently diagnosed rabid in areas where rabies outbreaks in wild animals had been identified. The incidence in cats, however, was more clustered geographically, especially in the Mid-Atlantic states (Figures 3 and 4). One may hypothesize that the greater independence and free-roaming nature of cats, coupled with possibly less stringent rabies vaccination practices resulted in cats being at higher risk than dogs of contracting rabies from rabid wild animals . Thus, they become a more frequent host for the virus.

The number of rabid cattle decreased from a peak of 465 in 1981 to 296 in 1982 to 204 in 1983. Despite this decline, cattle continued to be the domestic animal most frequently diagnosed rabid (Table 3).

Wild animals are frequently incriminated as the source of domestic animal rabies. The similar geographic distribution of domestic and wildlife rabies supports this "spillover" theory. This geographic association is most evident in the distribution of cattle and skunk rabies (Figures 5 and 6).

D. Rabies in Humans

Three rabies cases in U.S. citizens were reported in 1983 (2,3,4). Two occurred in adults and one in a 5-year-old child.

The 2 adults, a 30-year-old man and a 23-year-old woman, acquired rabies outside the United States. Both were presumably exposed when bitten by their own pet dogs, although neither animal was confirmed as rabid in the laboratory. One of the dogs had been recently vaccinated against rabies; the other, a puppy, was too young to vaccinate. The woman had received pre-exposure rabies prophylaxis, but neither of the two adults received post-exposure prophylaxis. (It should be emphasized that regardless of the rabies vaccine status of either the animal or the person, unless the suspect rabid animal is proven negative for rabies by either tissue examination or quarantine, those persons exposed should receive post-exposure prophylaxis.)

The third case involved a 5-year-old girl who never left the United States. The child was apparently exposed to a rabid bat in Michigan. This conclusion was based on the fact that the monoclonal antibody analysis of the rabies virus isolated from her did not reveal the characteristic antigenic patterns found in rabies isolates from terrestrial mammals in Michigan. Also, the similarity between this isolate and those from insectivorous bats in the United States suggests a bat as the origin of this isolate, even though an identical isolate has not been obtained.

A more detailed report of each of these cases follows:

1. The first case was in a 30-year-old man, an American architect from Waltham, Massachusetts. He had been bitten by a suspect rabid dog in Ososo, Nigeria, West Africa and he died on January 28, 1983, 28 days after the onset of symptoms.

   On October 8, 1982, the patient, who worked in Nigeria, was bitten on the right wrist while freeing his pet Doberman Pinscher from a trap. The dog died later that day and was buried without being examined for rabies. The patient sought medical attention at a nearby clinic and received tetanus immunization, but was told that post-exposure prophylaxis was unnecessary because the dog reportedly had recently been immunized against rabies.

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The patient returned to the United States 11 weeks later. He remained well until January 1, 1983, 85 days after the bite, when he developed numbness and tingling at the healed bite-site. During the next several days, the patient developed low back pain, a temperature of 38.9°C (102°F), sore throat, anorexia, and malaise. On January 5, he complained of difficulty breathing, mild chest discomfort, excessive salivation, and occasional gagging when attempting to drink. He was examined by a physician, who noted that he had non-specific ST-T changes on an electrocardiogram. He was admitted to a hospital in Massachusetts for further evaluation.

On admission, the patient was anxious and was producing a large volume of saliva, which he refused to swallow. He suggested that a milk deficiency caused his illness, and exhibited unusual fear of some medical procedures. His pharynx was slightly erythematous, and his neck and throat structures contracted when touched with the hands or examining instruments. The remainder of the physical examination was unremarkable. Laboratory tests revealed a white blood cell (WBC) count of 9,900, with a normal differential, normal serum electrolytes and calcium, and normal chest x-ray. On January 6, the patient exhibited marked hyperactivity and refused to swallow barium for a radiologic examination. On the evening of January 6, he had respiratory arrest and a generalized seizure, and an endotracheal tube was inserted. Following the respiratory arrest, his temperature rose to 41.1°C (106°F). Arterial blood gases demonstrated a pO_2 of 60.7 mm Hg, a pCO_2 of 36 mm Hg, and a pH of 7.26 on 40% inspired O_2. A lumbar puncture revealed an opening pressure of 200 mm H_2O, protein of 20 mg/dL, glucose of 113 mg/dL, four white blood cells (one polymorphonuclear leukocyte, three lymphocytes), and no bacteria. A chest x-ray showed diffuse pulmonary infiltrates. A diagnosis of rabies was considered, and the patient was placed in strict isolation. A skin biopsy, taken from the back of his neck above the hairline, was sent to CDC for direct immunofluorescent antibody (FA) testing for rabies.

On January 7, the biopsy was reported positive. The patient was able to communicate rationally with hospital staff by writing notes. He demonstrated marked pharyngeal and laryngeal spasms when his face or neck was stimulated by either a wet sponge or a draft of cool air. Bacterial cultures of cerebrospinal fluid (CSF), blood, urine, and sputum were negative. Computerized tomography and electroencephalogram (EEG) were normal. The patient continued to require ventilatory support and a dopamine infusion to maintain adequate blood pressure. On January 8, he was started on systemic interferon treatment. He was given human leukocyte interferon, 10 million units twice daily intramuscularly, and 5 million units once daily intraventricularly into a Hickham reservoir connected by a cannula to a lateral ventricle of his brain.

During the next 10 days, the patient became progressively less responsive and was in deep coma by January 18. He had numerous medical complications during the course of illness, including Pseudomonas sepsis and keratoconjunctivitis, recurrent seizures, hypo- and hyperthermia, anemia, hypotension, abnormal blood clotting, and

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acute renal failure. Marked elevation of lactic dehydrogenase (LDH) and serum transaminases (SGOT and SGPT) were noted, and serum creatine phosphokinase (CPK) peaked at 86,000 units/ml. Urine myoglobin remained negative. The interferon therapy was discontinued on January 25, 17 days after the first dose was administered. The patient developed adult respiratory distress syndrome refractory to ventilation and died of cardiovascular collapse on January 28.

Serum collected daily from the patient and tested at CDC for rabies antibody by the rapid fluorescent focus inhibition test (RFFIT) was positive (1:12) on the 16th day of illness and demonstrated a low titer (1:25 or less) until his death. CSF samples tested for rabies antibody were negative through the 19th day of illness and were unavailable for testing after that time. Direct FA testing of skin biopsies and a brain biopsy taken early in the illness from the frontal lobe cortex were positive for rabies; corneal impressions were negative. Rabies virus was isolated by mouse inoculation from CSF, nasal secretions, and saliva, both before and after the start of interferon therapy. Results of tests with monoclonal antibodies produced at CDC suggested that these isolates were typical street rabies viruses. At postmortem examination, many tissues were positive for rabies virus, including brain and spinal cord, skin and nerve from the bite site, pancreas, liver, bladder, periaortic lymph node, pericardium, adrenal gland, and salivary gland.

2. The second case was in a 5-year-old girl from Michigan, who was possibly bitten by a bat in late August 1982; she died on March 9, 1983, 32 days after onset of symptoms. The child had developed right-arm pain and fever after a fall on February 7, 1983. By February 11, she had malaise, anorexia, sore throat, left-heel pain, and right-arm weakness. She appeared ill but was alert and cooperative after hospitalization; she had point tenderness at her right wrist, elbow, shoulder, and left heel. The WBC count was 12,800, and a bone scan of the right wrist showed evidence of osteomyelitis. Over the next 48 hours, she became irritable, with temperatures to 39.3°C (103.9°F), progressive right-arm weakness, urinary incontinence, and difficulty swallowing saliva and water.

On February 13, she became lethargic and hypertensive, and was transferred to another hospital. Rabies was considered, but no clear history of animal exposure could be obtained. CSF revealed 10 WBC and negative bacterial cultures. Computerized axial tomography and brain scans were normal; an EEG was diffusely abnormal without focal findings. The next day, she became obtunded, developed progressive respiratory distress, and required mechanical ventiliation. The presumptive diagnosis was post-infectious encephalopathy, and treatment with high-dose steroids was initiated. By February 17, she was comatose.

On February 23, the family remembered a possible bat bite in late August 1982.

Sera collected on February 23, 18 days after the onset of symptoms, showed low titers of rabies antibody by RFFIT and by immunoadherence hemagglutination (IAHA) tests performed at the

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Michigan Department of Public Health (MDPH). Antibody was not present in the CSF. Since skin biopsy and mouse inoculation were negative, the serum results were not considered sufficient to confirm the diagnosis of rabies. Sera and CSF collected around February 28, showed no titer rise, but on March 4, a serum specimen and CSF showed rises to 1:25 and 1:17, respectively, by RFFIT, and a presumptive diagnosis of rabies was made. On March 9, the patient experienced cardiac arrest and died. The MDPH identified rabies virus from the brain by direct FA. Of the 254 persons at the two hospitals who had contact with potentially infectious secretions from the patient, 54 received post-exposure rabies prophylaxis.

3. The third case occurred in a 23-year-old American Peace Corps volunteer working in Kenya. The woman was bitten by her puppy on May 31, 1983, and she died of rabies on August 27, 89 days after the bite and 20 days after the onset of symptoms. Medical records indicate that in November 1982, the patient had been given three intradermal doses of human diploid cell rabies vaccine (HDCV), 0.1 ml each, for pre-exposure prophylaxis. She was reportedly informed at that time that additional doses of vaccine would be needed if she became exposed to rabies. The patient's May 31 diary entry described a behavior change in her puppy (which was too young to be immunized against rabies) and her hope that he was not rabid because he had bitten her.

The patient was well until approximately August 8, when she noted left arm pain. On August 10, she was seen in a Nairobi medical clinic with complaints of insomnia and increasing left arm, shoulder, and neck pain. She was hospitalized on August 11 and placed in the intensive care unit. When asked about animal exposures, she failed to report the bite.

Rabies virus was isolated at CDC from a cervical cord specimen obtained at autopsy, and monoclonal antibody studies indicated that the isolate was street rabies and not one of the rabies-related viruses, such as Mokola or Duvenhage, which have been isolated from humans in sub-Saharan Africa.

E. Rabies in Rodents

In 1983, rodents were diagnosed as rabid in seven states. These included Maryland (5 woodchucks, 2 beavers); Virginia (6 woodchucks); Pennsylvania (3 woodchucks, 1 squirrel); Delaware, Indiana, and Minnesota (1 woodchuck each); and South Carolina (1 chipmunk). In 1982, 17 rodents were diagnosed as rabid in 8 states. The states reporting the most cases in 1983 (Maryland, Virginia, and Pennsylvania), also reported 10 (59%) of the 17 cases in 1982.

Historically, rodents (which, for surveillance purposes, include the members of the order Rodentia--rats, mice, squirrels, muskrats, etc.--and the members of the closely related order Lagamorpha--rabbits, hares, pikas) have not been thought to be an important vector or reservoir of rabies. No cases of human rabies have ever been associated with them. However, rodent bites continue to account for a high proportion of animal bites of humans, and exposures to rodents generate substantial concern regarding the use of both rabies diagnostic test and post-exposure rabies prophylaxis.

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Data from the past 13 years recently analyzed at CDC provide additional support to the minimal importance of rodents as rabies hosts. Yet, the actual number of laboratory-confirmed cases of rodent rabies increased from an average of 3 cases/year during 1971-1973 to an average of 16 cases/year in 1981-1983 (CDC, unpublished data). Woodchucks are the only species with an actual increase in number of cases, the incidence among other rodents having remained relatively constant or even decreasing. Of the 48 rodent rabies cases reported from 1981 through 1983, 36 occurred in woodchucks (Marmota monax); 26 (72%) of these were reported from the Mid-Atlantic states (Maryland, Pennsylvania, Virginia, and West Virginia). Monoclonal studies performed at CDC identified the isolates as raccoon virus.

In summary, the overall incidence of rabies in rodents (0.07% of all cases in 1983) remains very low outside the Mid-Atlantic outbreak area . As a result, bites of humans by rodents do not necessitate testing of the animals or post-exposure rabies prophylaxis, except in unusual circumstances, such as an unprovoked attack.

F. Mid-Atlantic States Raccoon Rabies Outbreak, 1983

During 1983, the raccoon rabies outbreak in the Mid-Atlantic region remained the most significant U.S. rabies epizootic. The total number of rabid raccoons reported from the 4 involved states (Maryland, Pennsylvania, Virginia, and West Virginia) and the District of Columbia doubled from 837 reported in 1982 to 1,608 reported in 1983. Of these states, only Virginia reported a decrease in numbers of rabid raccoons, although the outbreak expanded south into 8 new counties in that state during the year. Expansion was also evident in all other directions. At least 25 Mid-Atlantic counties reported rabid raccoons for the first time during 1983 (Figures 10 and 11).

Nearly 85% of the rabid animals reported were raccoons, with some spillover to other wildlife and domestic animals. Several species of wildlife not usually considered at high risk for rabies were reported positive including 14 woodchucks, 2 beavers, 3 opossums, 1 deer, 1 squirrel, and 1 red panda. The panda was a resident of the National Zoo in Washington, D.C. where at least 14 rabid raccoons were found during the outbreak. It is unknown whether finding rabies in unexpected species is related to the virus strain, the intensity of the epizootic, or to the fact that more animals are being examined. The number of rabid cats (32) reported in the 5 jurisdictions far exceeded the number of rabid dogs (5).

The most intensely affected areas in this outbreak continue to be urban and suburban, as evidenced by the 158 rabid raccoons reported from the District of Columbia. Urban areas apparently provide a very suitable habitat for raccoons, and the high concentration of people and pets in these areas leads to more wildlife encounters that result in submission of wild animals for testing. There is no reason to believe that this outbreak will spare other metropolitan areas such as Baltimore and Philadelphia as it continues to spread.

G. Monoclonal Antibody Analysis of Various Strains of Rabies Virus

The demonstration of antigenic differences among strains of rabies virus by monoclonal antibodies allows the evaluation of many strains from different

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animals and geographic regions. Within one outbreak area, a single homogeneous antibody reaction pattern generally is found among viruses from all affected species of terrestrial mammals. In contrast, isolates from different areas can be identified by their different reaction with the antibodies (5).

For example, there are at least 2 strains of rabies virus associated with the large skunk rabies endemic area in the central United States. The first group includes isolates collected from endemic areas of the northern central United States (Minnesota, Wisconsin, Iowa, Illinois), the northeastern portions of Missouri and Arkansas, and isolates from the area of endemic skunk rabies, which stretches from Ohio through the central portions of Tennessee and Kentucky and the western tip of Virginia. Isolates from skunk rabies areas of northern California are included in this group. A second large group of antigenically distinct viruses is found in isolates collected from skunk rabies areas of the south central United States (Texas, Kansas, western Arkansas, and Missouri). Although these 2 antigenically separate virus groups now appear (with the exception of California) as one large outbreak area, they originated as 2 separate outbreaks (6).

A third group of antigenically distinct rabies viruses is associated with the recent outbreak of rabies in raccoons in the Mid-Atlantic region. Rabies virus from raccoons and other terrestrial animals in this area is identical to that found in rabid raccoons in the southeastern United States. This finding supports the theory that the Mid-Atlantic outbreak may have originated from infected animals transported from the southeastern United States.

A fourth group of viruses includes isolates from the fox rabies endemic area of the extreme Northeast (New York and Maine) (Figure 7) and is identical to virus isolates collected from fox rabies areas of Ontario and Quebec, Canada.

Isolates from a small 4-county focus of fox rabies in central Texas are interesting because they differ from skunk virus isolates collected from the same area. This group is an exception to the general finding that a single major host species and virus type is found within an outbreak area, and isolates from other species usually reflect the virus found in the major host species. In this small outbreak area there are 2 major virus types, each associated with a separate species.

In contrast to the ease with which isolates from terrestrial mammals could be grouped, an interesting diversity of antigens was found among isolates of rabies from bats. With the exception of virus isolates from 2 bat species (Tadarida brasiliensis from Texas and Nevada and Eptesicus fuscus from the Atlantic coast), virus isolates collected from bat species within the United States do not readily lend themselves to grouping by analysis with monoclonal antibodies. Isolates collected from the same species and geographic area may vary, and a surprising diversity of antigenic types has been found in the 5 bat species studied to date.

It was this diversity of antigenic reaction that led CDC to compare the monoclonal antibody rabies diagnostic reagent prepared by Centocor (Centocor Inc., Malvern, Pa.) with the hyperimmune serum reagents currently in use. Excellent correlation of results was reported by public health laboratories in 7 states (California, Maryland, Michigan, New York, South Carolina, Texas, and Virginia). In addition, rabies specimens from an additional 20 states were tested at CDC. A total of 1,690 specimens were examined with both hyperimmune

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serum and monoclonal antibody rabies diagnostic reagents. These included rabies-positive samples from 132 bats and 275 terrestrial animals. The quality, intensity, and amount of staining found in these positive tissues with the monoclonal antibody reagent was identical to that of the hyperimmune serum reagent. All but 3 of the rabies-negative tissues were negative for staining by both reagents. These 3 specimens contained a Streptococcus species that was specifically stained only by a commercial hyperimmune serum reagent. These encouraging results suggest that the monoclonal antibody reagent is a suitable alternative to hyperimmune serum antibody for diagnosing rabies.

II. INTERNATIONAL REPORTS

A. RABIES IN CANADA, 1983

A total of 2,252 cases of animal rabies in Canada were reported in 1983--a 13.5% decline from the 2,602 cases in 1982 (1,7). Foxes and skunks continued to be the major sources of rabies among wild species, as did cattle among domestic animals (Table 7).

The province of Ontario accounted for 88% of all reported cases. The rabies viruses became established in the skunk and fox populations of Ontario in the 1940's and 1950's from an outbreak that extended down from the Arctic. They have continued to sweep across the province in a wave-like pattern with a peak-to-low cycle every 3-5 years (8).

The rolling terrain of southeastern Ontario province provides a suitable habitat for foxes and skunks because of its numerous burrows and old farmsteads. Although the terrain of southern Quebec is rather similar to that of Ontario, the Ottawa River has served as a major barrier to the spread of this outbreak to the northeast.

A spillover of the virus from the wild to domestic animals is strongly suspected since over 95% of all cases of rabies in domestic animals also occurred in Ontario. Monoclonal antibody studies are being carried out to document this crossover. Of the domestic species, cattle were diagnosed rabid most frequently. A probable explanation for this is their increased risk of exposure to wild animals when they forage on pasture.

It is of interest to note that, as in the United States, the reported incidence of rodent rabies in Canada remained very low, accounting for only 0.13% of all cases in 1983.

B. RABIES IN MEXICO, 1983

A total of 3,487 cases of rabies (3,432 animal and 55 human) were reported to the Division of Zoonoses Control, Mexican Ministry of Health and Welfare (S.S.A.) in 1983 (9). This represented 174 (5%) more cases than the 3,313 cases reported in 1982 (1).

Throughout most of Central and South America, dogs are the major reservoir and vector of human rabies. Dogs accounted for 92.5% of all animal rabies reported in Mexico for 1983. The pattern and occurrence of animal rabies in Mexico and many other developing countries is very different from that in the United States and Canada where dog rabies has been significantly reduced. Table 8 and Figure 13 provide additional data concerning the occurrence of rabies by species and state in Mexico.

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IV. TABLES AND FIGURES

TABLE 1. REPORTED RABIES CASES IN THE UNITED STATES,[a] BY TYPE OF ANIMAL

1965-1983

YEAR	DOGS	CATS	FARM ANIMALS	FOXES	SKUNKS	BATS	RACCOONS	OTHER ANIMALS	MAN	TOTAL
1965	412	289	625	1,038	1,582	484	99	54	1	4,584
1966	412	252	587	864	1,522	377	133	50	1	4,198
1967	412	293	691	979	1,568	414	143	107	2	4,609
1968	296	157	457	801	1,400	291	153	57	1	3,613
1969	256	165	428	888	1,156	321	255	52	1	3,522
1970	185	135	399	771	1,235	296	181	71	3	3,276
1971	235	222	484	677	2,018	465	190	99	2	4,392
1972	232	184	547	645	2,095	504	162	56	2	4,427
1973	180	139	448	477	1,851	432	114	56	1	3,698
1974	232	121	303	302	1,421	537	176	63	0	3,155
1975	129	104	200	276	1,226	514	192	31	3	2,675
1976	116	106	198	187	1,468	737	277	55	2	3,146
1977	120	108	217	122	1,631	637	281	65	1	3,182
1978	119	96	254	148	1,657	567	404	49	4	3,298
1979	196	156	284	145	3,031	756	543	34	5	5,150
1980	247	214	499	213	4,096	726	394	92	0	6,481
1981	216	285	581	196	4,480	858	481	111	2	7,210
1982	153	209	381	222	3,088	975	1,156	94	0	6,278
1983	132	168	284	111	2,285	910	1,906	82	2[b]	5,880

[a]Includes Guam, Puerto Rico, and Virgin Islands.
[b]Does not include one human who acquired and was treated for rabies outside the United States.

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TABLE 2.CASES OF RABIES IN THE UNITED STATES, BY STATE
1966 – 1983

STATE	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	4,198	4,609	3,613	3,522	3,276	4,392	4,427	3,399	3,185	2,675	3,146	3,182	3,299	5,150	6,481	7,210	6,278	5,890
Alabama	22	52	29	60	49	61	82	52	48	34	18	13	53	73	55	123	146	83
Alaska	2	2	33	7	21	43	11	7	14	6	4	40	10	19	53	44	89	20
Arizona	53	66	65	39	48	40	61	39	50	26	31	49	23	27	77	30	60	33
Arkansas	78	93	57	37	53	108	112	108	61	83	155	118	160	332	191	152	157	160
California	308	324	372	313	322	322	275	401	358	290	357	434	355	358	544	579	517	358
Colorado	18	15	9	40	66	33	23	19	50	32	52	56	37	51	51	39	47	36
Connecticut	1	0	1	12	4	17	7	5	7	8	5	8	8	2	10	6	5	6
Delaware	0	0	1	0	0	4	7	6	1	6	22	2	3	2	4	3	2	7
District of Columbia	0	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	162
Florida	78	82	111	178	97	76	87	43	50	37	100	93	47	79	101	116	80	131
Georgia	110	121	83	118	116	146	109	94	138	170	225	210	288	338	250	225	213	214
Hawaii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idaho	7	5	4	3	4	4	1	1	4	0	8	4	7	0	2	7	11	17
Illinois	192	195	135	88	158	318	277	202	120	65	50	51	76	226	520	552	294	236
Indiana	116	89	90	58	31	82	84	57	15	10	24	12	13	68	75	91	76	30
Iowa	188	136	126	103	136	240	350	214	130	102	125	134	150	206	545	881	377	200
Kansas	65	109	52	72	107	112	129	101	75	60	68	42	34	128	159	211	147	83
Kentucky	125	227	413	212	141	187	271	238	157	96	63	29	78	139	153	131	134	83
Louisiana	58	70	42	42	69	62	49	52	25	8	8	22	17	41	20	31	32	34
Maine	28	27	55	7	49	198	100	69	5	52	41	34	79	31	31	20	21	17
Maryland	6	5	5	3	3	3	19	16	27	15	40	16	22	39	37	50	153	828
Massachusetts	4	5	6	3	4	6	6	7	4	12	26	10	7	9	15	11	9	16
Michigan	43	25	17	13	28	48	9	12	7	10	8	6	11	16	15	15	7	20
Minnesota	218	178	259	179	126	265	295	373	254	184	193	342	204	172	278	491	224	171
Mississippi	22	11	7	6	3	5	4	1	3	1	2	1	6	7	4	4	13	9
Missouri	262	178	123	155	125	148	110	92	41	42	72	59	95	307	379	232	123	97
Montana	8	10	15	9	3	6	7	41	36	172	92	56	26	21	56	123	97	119
Nebraska	34	72	30	16	17	12	18	7	5	4	20	2	8	4	92	199	126	64
Nevada	10	10	2	13	11	5	2	4	4	7	17	7	7	6	1	6	6	38
New Hampshire	28	48	3	5	2	4	4	38	3	2	1	2	3	5	8	6	1	5
New Jersey	23	21	14	16	11	20	21	18	28	22	27	28	14	12	18	24	16	24
New Mexico	19	30	42	20	16	9	16	7	78	42	22	21	27	49	21	28	22	15
New York	215	90	45	244	260	136	45	30	43	76	27	65	62	48	40	85	113	84
North Carolina	4	3	13	4	3	5	4	14	26	12	16	14	16	26	18	18	66	24
North Dakota	88	171	137	79	57	193	147	159	114	103	137	122	105	99	255	359	97	92
Ohio	200	128	90	75	60	123	101	38	32	18	35	18	23	41	57	81	81	60
Oklahoma	190	377	126	74	103	283	299	174	164	105	181	243	177	293	247	219	189	107
Oregon	5	5	6	4	4	9	4	8	6	6	11	16	14	17	4	12	5	3
Pennsylvania	16	16	11	14	4	23	63	29	18	20	24	19	22	17	19	14	75	168
Rhode Island	0	2	0	0	3	1	2	1	4	4	5	0	0	2	1	2	0	2
South Carolina	1	2	0	0	0	20	13	6	6	11	5	35	119	173	62	49	66	35
South Dakota	118	142	132	53	119	167	132	151	164	85	114	139	97	143	471	322	115	149
Tennessee	353	559	282	132	65	108	316	149	53	21	48	37	35	109	145	251	356	190
Texas	448	401	264	330	227	323	344	264	396	326	347	389	556	1,194	945	697	784	703
Utah	3	3	4	5	2	9	9	3	1	3	21	11	7	11	10	12	18	11
Vermont	27	19	11	38	57	16	10	3	1	0	0	0	2	1	0	0	2	2
Virginia	259	210	148	386	216	79	109	99	113	114	56	5	14	19	37	166	745	625
Washington	15	2	2	5	8	5	9	10	2	10	14	7	5	21	3	15	8	10
West Virginia	60	63	55	120	153	121	60	25	32	5	17	11	15	12	27	35	62	120
Wisconsin	64	62	53	45	60	93	156	154	109	72	97	90	94	119	294	336	193	119
Wyoming	9	6	9	56	6	14	2	0	25	38	19	9	11	12	15	34	27	10
Guam	0	89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puerto Rico	19	37	21	31	49	80	56	57	49	50	54	51	40	26	68	93	66	50
Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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TABLE 3. CONFIRMED RABIES CASES IN THE UNITED STATES, BY STATE AND ANIMAL–1983

	DOMESTIC ANIMAL							WILD ANIMAL												
	Dogs	Cats	Cattle	Horses & Mules	Sheep & Goats	Swine	Domestic Animal Total	Skunks	Bobcats	Coyotes	Foxes	Raccoons	Bats	Rodents & Lagomorphs	Other Wild Animals	Wild Animal Total	Human	Total All Sources	More or Less Than 1982	
TOTALS	**132**	**168**	**204**	**64**	**13**	**3**	**584**	**2,285**	**5**	**1**	**111**	**1,906**	**910**	**21**	**55**	**5,294**	**2**	**5,880**		
STATE																				**STATE**
Alabama	1	0	1	0			2	8			1	42	30	0	0	81		83	–	Alabama
Alaska	2	0	0	0			2	0			15	0	0	0	3-Arctic Foxes	18		20	–	Alaska
Arizona	0	0	0	0			0	10	1	1	2	0	19	0	0	33		33	–	Arizona
Arkansas	4	1	7	2			14	128			2	0	16	0	0	146		160	+	Arkansas
California	1	2	5	2			10	194	1		1	4	148	0	0	348		358	–	California
Colorado	0	0	0	0			0	0			0	0	36	0	0	36		36	–	Colorado
Connecticut	0	0	0	0			0	0			0	0	6	0	0	6		6	+	Connecticut
Delaware	0	0	0	0			0	0			0	1	5	1	0	7		7	+	Delaware
Dist. of Columbia	0	1	0	0			1	0			0	158	1	0	1-Opossum 1-Lesser Panda	161		162	++	Dist. of Columbia
Florida	1	2	1	0			4	1	1		0	56	69	0	0	127		131	+	Florida
Georgia	1	6	1	1			9	7			8	168	22	0	0	205		214	+	Georgia
Hawaii	0	0	0	0			0	0			0	0	0	0	0	0		0	0	Hawaii
Idaho	0	0	0	0			0	0			0	0	17	0	0	17		17	+	Idaho
Illinois	17	12	10	3			42	153			2	1	38	0	0	194		236	–	Illinois
Indiana	0	0	3	2			5	17			0	0	7	1	0	25		30	–	Indiana
Iowa	14	18	34	6	3		75	120			0	0	5	0	0	125		200	–	Iowa
Kansas	1	5	1	5			12	67			0	1	3	0	0	71		83	–	Kansas
Kentucky	14	1	2	3		1	21	52			4	1	5	0	0	62		83	–	Kentucky
Louisiana	1	2	0	1			4	23			0	0	7	0	0	30		34	+	Louisiana
Maine	0	0	0	0			0	0			10	0	7	0	0	17		17	–	Maine
Maryland	0	9	3	0			12	28			5	732	43	7	1 Deer	816		828	++	Maryland
Massachusetts	0	0	0	0			0	0			0	0	15	0	0	15	1	16	+	Massachusetts
Michigan	1	0	0	0			1	0			0	1	17	0	0	18	1	20	+	Michigan
Minnesota	3	11	23	0		1	38	120			0	3	9	1	0	133		171	–	Minnesota
Mississippi	0	0	0	0			0	0			0	0	9	0	0	9		9	–	Mississippi
Missouri	5	3	2	0			10	76			0	0	11	0	0	87		97	–	Missouri
Montana	3	4	1	2			10	94			0	0	15	0	0	109		119	+	Montana
Nebraska	3	4	5	1	1		14	48			0	1	1	0	0	50		64	–	Nebraska
Nevada	0	0	0	0			0	0			0	0	38	0	0	38		38	+	Nevada
New Hampshire	0	0	0	1			1	0			1	0	3	0	0	4		5	+	New Hampshire
New Jersey	0	0	0	0			0	0			0	0	24	0	0	24		24	+	New Jersey
New Mexico	0	1	0	0			1	7			0	0	7	0	0	14		15	–	New Mexico
New York	2	2	7	0	1		12	19			24	0	29	0	0	72		84	–	New York
North Carolina	0	0	1	0			1	6			0	0	17	0	0	23		24	–	North Carolina
North Dakota	5	5	12	3			25	67			0	0	0	0	0	67		92	–	North Dakota
Ohio	2	1	3	1			7	26			1	1	25	0	0	53		60	–	Ohio
Oklahoma	6	5	9	6			26	78			0	0	3	0	0	81		107	–	Oklahoma
Oregon	0	0	0	0			0	0			0	0	3	0	0	3		3	–	Oregon
Pennsylvania	5	10	3	1			19	29			0	81	33	4	2- Opossum	149		168	+	Pennsylvania
Rhode Island	0	0	0	0			0	0			0	0	0	0	1 Weasel 1 Unknown	2		2	+	Rhode Island
South Carolina	0	2	0	0			2	1	1		1	20	9	1	0	33		35	–	South Carolina
South Dakota	1	16	17	2	2		38	106			1	0	4	0	0	111		149	+	South Dakota
Tennessee	8	2	1	0			11	171			2	0	5	0	1 Weasel	179		190	–	Tennessee
Texas	13	27	24	20	6	1	91	505	1		14	2	88	0	1 Deer 1-Opossum	612		703	–	Texas
Utah	0	0	0	0			0	1			0	0	10	0	0	11		11	–	Utah
Vermont	0	0	0	0			0	0			0	0	2	0	0	2		2	0	Vermont
Virginia	0	6	3	0			9	33			15	545	17	6	0	616		625	–	Virginia
Washington	0	0	0	0			0	0			0	0	10	0	0	10		10	+	Washington
West Virginia	1	6	3	0			10	14			1	88	7	0	0	110		120	+	West Virginia
Wisconsin	9	4	21	1			35	76			1	0	5	0	1 Badger 1 Ferret	84		119	–	Wisconsin
Wyoming	0	0	0	0			0	0			0	0	10	0	0	10		10	–	Wyoming
Guam	0	0	0	0			0	0			0	0	0	0	0	0		0	0	Guam
Puerto Rico	8	0	1	1			10	0			0	0	0	0	40 Mongooses	40		50	–	Puerto Rico
Virgin Islands	0	0	0	0			0	0			0	0	0	0		0		0	0	Virgin Islands

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Table 4. Human Rabies Cases, by 4-Year Period and Source of Exposure, United States, 1946-1983

Years	Total Cases	Cases for which exposure source is identified	Source of Exposure§					
			Dog	Cat	Fox	Skunk	Bat	Bobcat
1946-1949	94	48	43	5	0	0	0	0
1950-1953	81	54	47	2	3	1	1	0
1954-1957	37	29	23	1	1	3	1	0
1958-1961	18	15	7	1	3	1	3	0
1962-1965	5	5	3	0	0	1	1	0
1966-1969	5	4	2¶	0	0	1	0	1
1970-1973	8	7	2¶	0	0	2	3	0
1974-1977	6	5	3¶	1	0	0	1	0
1978-1981	11	3	3¶	0	0	0	0	0
1982-1983 (2 yrs.)	3	3	2¶	0	0	0	1	0
Total	268	173	135	10	7	9	11	1

§ Confirmed or most probable source

¶ These exposures occurred outside of continental United States

Table 5. Positivity Rates in Animals Tested for Rabies, U.S., 1983

Animal	Positive/Examined	% Positivity
Dog	132/19,783	0.67
Cat	168/21,549	0.78
Cattle	204/2,626	7.77
Other domestic	80/1,580	5.06
Skunk	2,285/6,004	38.06
Fox	111/1,781	6.23
Bat	910/10,280	8.85
Raccoon	1,906/10,269	18.56
Rodent/Lagomorph	21/8,841	0.24
Other wildlife	61/2,680	2.28
Total	5,880/85,393	6.89

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Table 6. Animal Rabies Cases by Month, United States, Jan. 1983 - Dec. 1983

	J	F	M	A	M	J	J	A	S	O	N	D	Unk	Total
Dog	12	19	14	18	15	8	11	12	6	6	9	2	0	132
Cat	10	15	8	11	11	24	21	16	12	11	17	12	0	168
Cattle	17	22	36	18	20	20	11	13	10	14	11	12	0	204
Other Domestic	7	6	6	9	11	3	7	6	7	3	7	3	5	80
Skunks	192	173	357	384	244	233	166	133	100	124	102	77	0	2285
Fox	8	13	12	20	11	13	3	9	4	4	5	9	0	111
Bats	9	8	12	29	75	93	116	200	224	105	29	10	0	910
Raccoons	110	166	253	255	173	191	115	138	127	142	113	123	0	1906
Rodents/ Lagomorphs	0	1	1	4	2	5	2	1	1	2	0	2	0	21
Other wild	6	2	7	7	4	4	4	7	3	6	2	6	3	61
Total	371	425	706	755	566	594	456	535	494	417	295	256	8	5878

Table 7. Reported Animal Rabies in Canada by Animal and Province, 1983

Province	Dog	Cat	Cattle	Other Livestock	Fox	Skunk	Bat	Raccoon	Coyote	Other Animal	Human	Total
Alberta		3				32	5					40
Br. Columbia							9					9
Manitoba		1	6	1*		43						51
Maritimes												0
N.W.T.	1				4							5
Ontario	60	90	326	58**	735	647	47	8	7	6¶		1984
Quebec	2	1	3		18	2						26
Saskatchewan		1	5	1*		128	2					137
Yukon T.	—	—	—	—	—	—	—	—	—	—	—	0
Total	63	96	340	60	757	852	63	8	7	6	0	2252

*horse
**13 horses, 33 sheep, 9 goats, 3 pigs
¶2 ground hogs, 1 wolf, 1 donkey, 1 mink, 1 bison

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Table 8. Reported Rabies in Mexico by Animal and State, 1983

State	Dog	Cat	Bat	Other Animal	Human	Total
Aguascalientes	12	-	-	1	-	13
B. California Norte	-	-	-	-	-	-
B. California Sur	-	1	-	-	-	1
Campeche	-	-	-	-	-	-
Coahuila	155	5	2	10	3	175
Colima	3	-	-	1	1	5
Chiapas	10	-	-	-	1	11
Chihuahua	32	-	-	2	2	36
Distrito Federal	226	34	-	-	-	260
Durango	188	4	-	-	1	193
Guanajuato	342	2	-	18	1	363
Guerrero	64	5	-	5	1	75
Hidalgo	153	4	-	2	4	163
Jalisco	29	7	-	1	-	37
Mexico	591	20	-	48	7	666
Michoacan	34	-	-	-	4	38
Morelos	156	5	-	1	2	164
Nayarit	20	3	-	3	4	30
Nuevo Leon	42	5	-	3	-	50
Oaxaca	1	1	-	-	5	7
Puebla	319	-	-	-	7	326
Queretaro	94	-	-	1	-	95
Quintana Roo	2	-	1	-	-	3
San Luis Potosi	84	9	-	5	-	98
Sinaloa	62	3	-	-	4	69
Sonora	141	11	-	9	1	162
Tabasco	30	-	-	-	1	31
Tamaulipas	43	3	-	2	-	48
Tlaxcala	182	1	-	6	1	190
Veracruz	104	-	-	-	4	108
Yucatan	20	7	-	-	1	28
Zacatecas	37	3	-	2	-	42
Total	3,176	133	3	120	55	3,487

Fig. 1 REPORTED RABIES CASES IN WILD AND DOMESTIC ANIMALS BY YEAR, UNITED STATES, 1953–1983

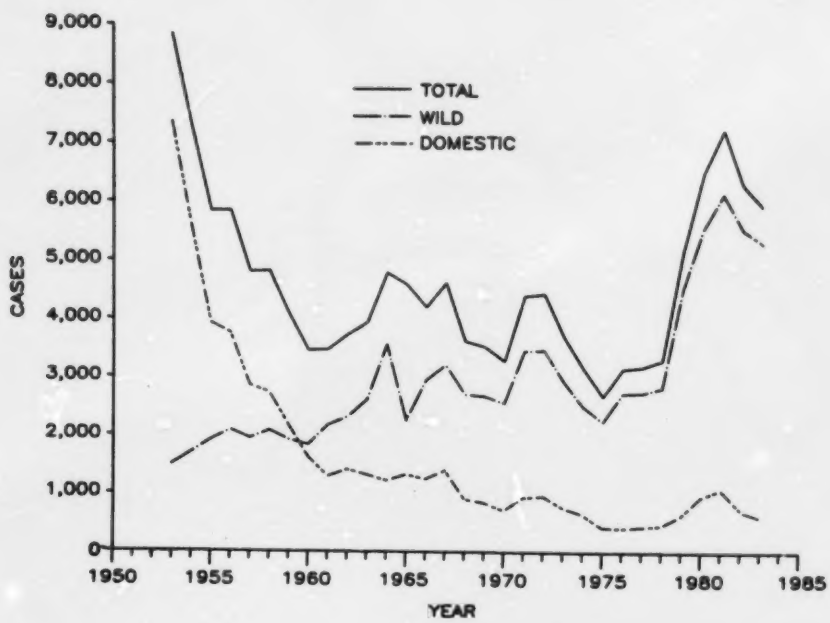

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Fig. 2 REPORTED HUMAN RABIES CASES, UNITED STATES, JANUARY 1952–DECEMBER 1983

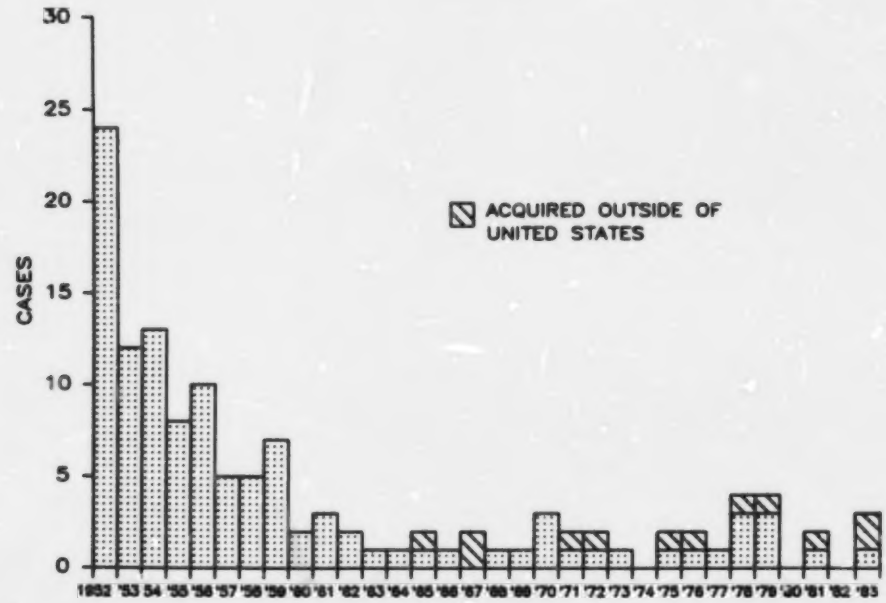

Fig.3 COUNTIES REPORTING DOG RABIES, 1983

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Fig.4 COUNTIES REPORTING CAT RABIES, 1983

Fig.5 COUNTIES REPORTING CATTLE RABIES, 1983

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Fig.6 COUNTIES REPORTING SKUNK RABIES, 1983

Fig.7 COUNTIES REPORTING FOX RABIES, 1983

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Fig.8 COUNTIES REPORTING RACCOON RABIES, 1983

Fig.9 COUNTIES REPORTING BAT RABIES, 1983

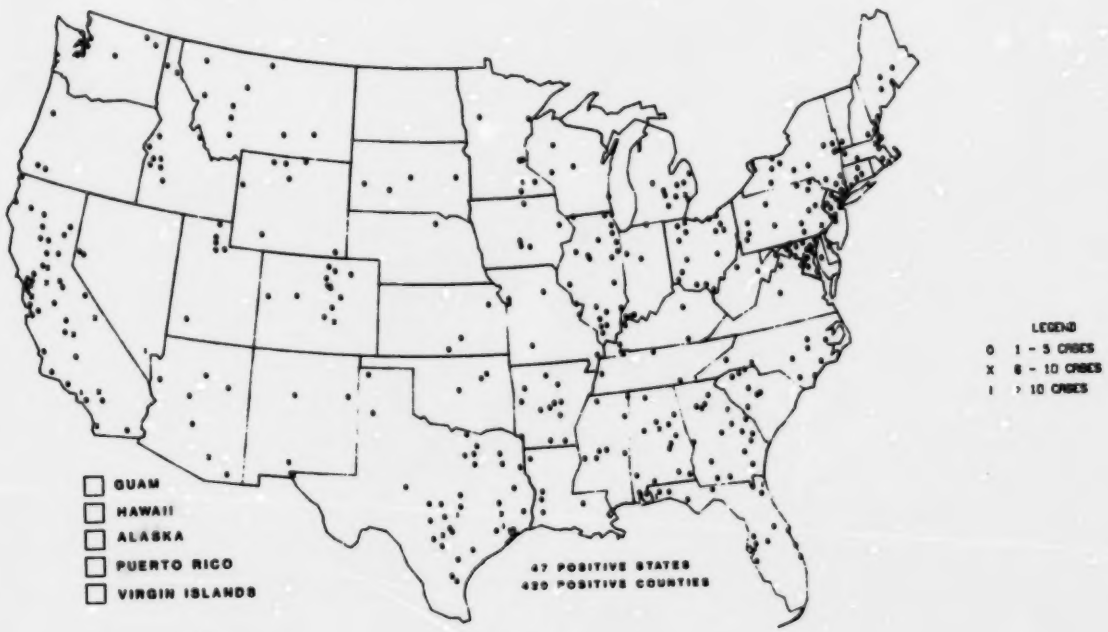

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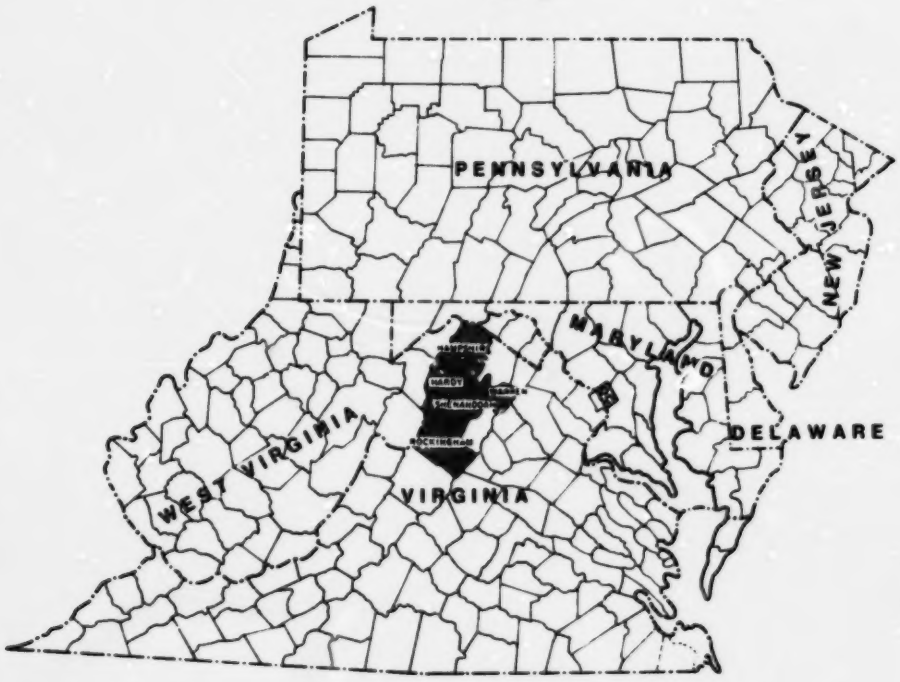
FIG. 10 COUNTIES REPORTING RACCOON RABIES

1980



1981

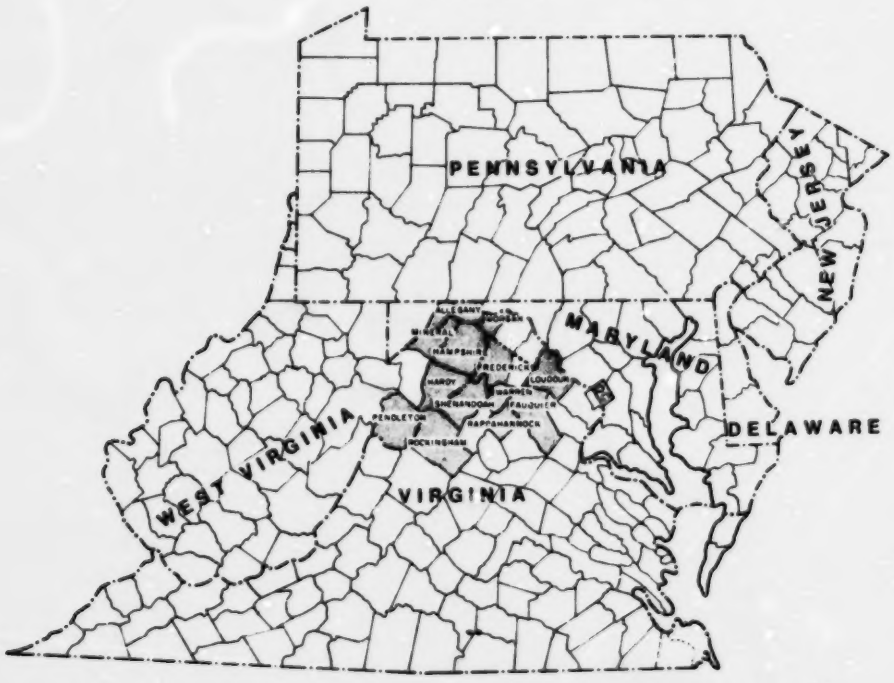


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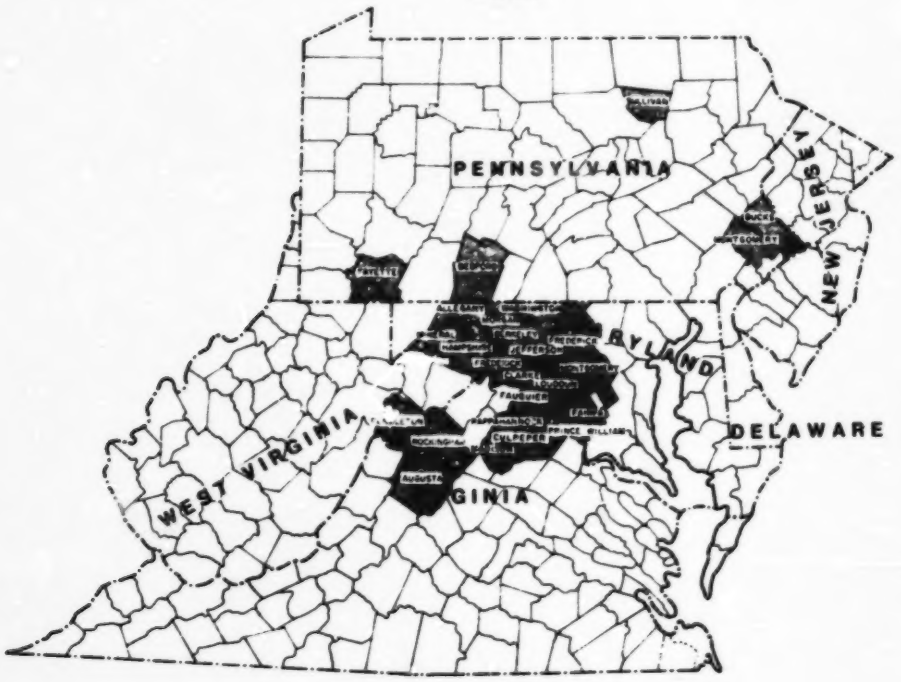
FIG. 10 - CONT. COUNTIES REPORTING RACCOON RABIES

1982



1983

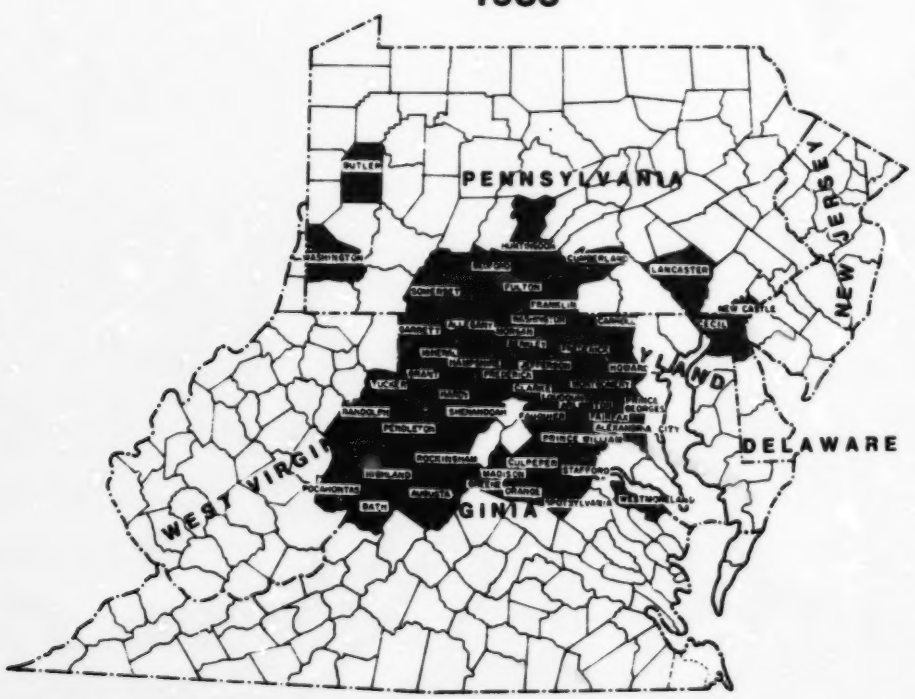


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Fig.11 FREQUENCY OF RACCOON RABIES CASES BY COUNTY, 1983

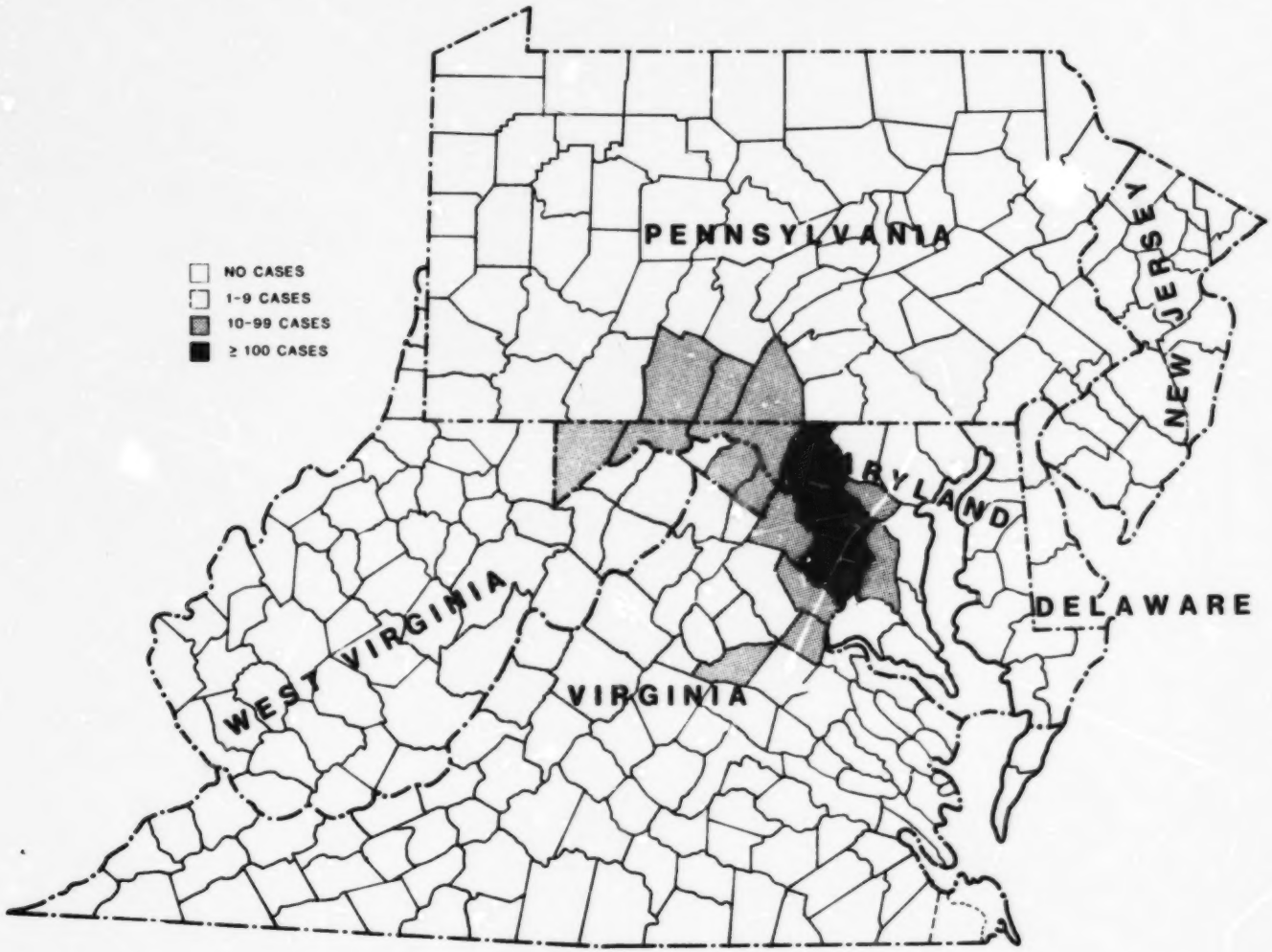

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Fig.12 RABIES CASES IN CANADA, 1983

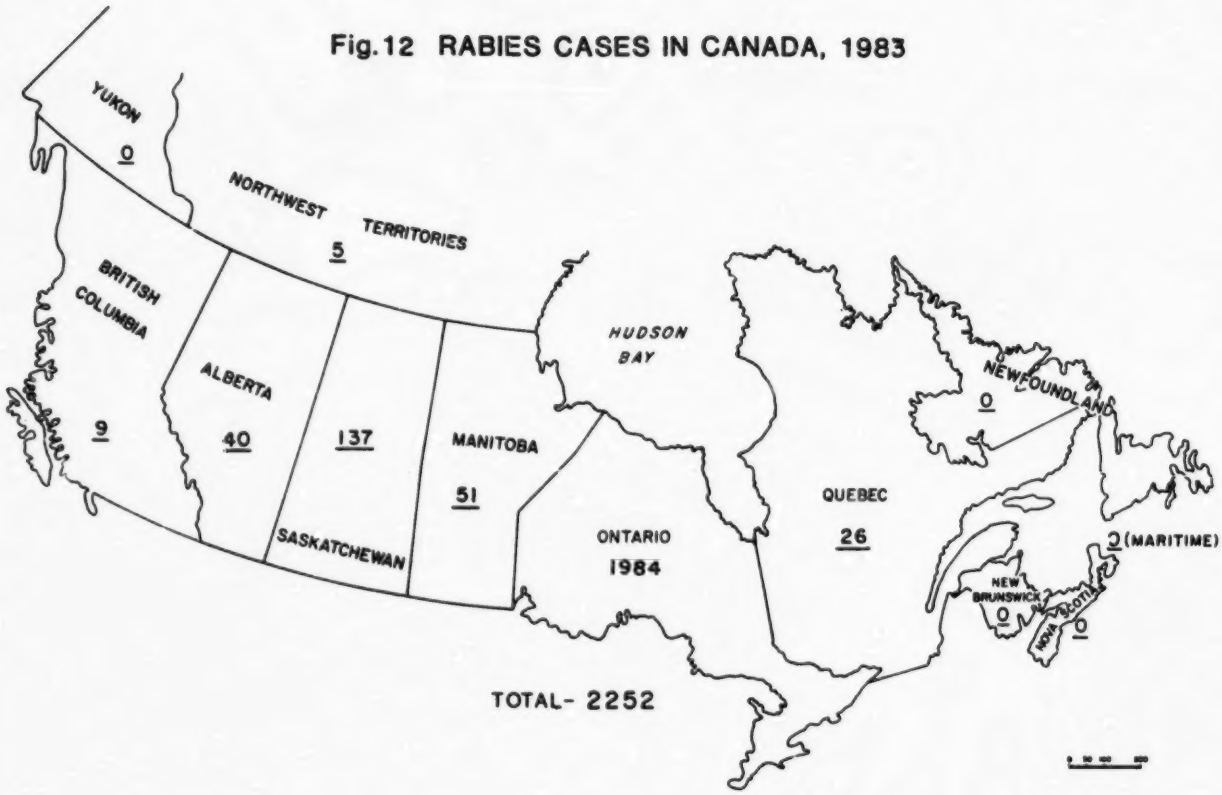

Fig.13 RABIES CASES IN MEXICO, 1983

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STATE AND TERRITORIAL EPIDEMIOLOGISTS AND STATE PUBLIC HEALTH VETERINARIANS

Key to all disease surveillance activities are the State and Territorial Epidemiologists and the State Public Health Veterinarians. Their contributions to this report are gratefully acknowledged.

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